

(12) UK Patent Application (19) GB 2 319 195 (13) A

(43) Date of A Publication 20.05.1998

(21) Application No 9715601.2

(22) Date of Filing 25.07.1997

(30) Priority Data

(31) 08747545 (32) 12.11.1996 (33) US

(60) Parent of Application No(s) 9727392.4 under Section 15(4) of the Patents Act 1977

(51) INT CL⁶

A61H 33/02 , B05B 7/04

(52) UK CL (Edition P)

B2F FD F120 F207 F305 F316 F350

A4N N2D1 N5

U1S S1713

(56) Documents Cited

US 5291621 A US 4586204 A

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(58) Field of Search

UK CL (Edition O) A4N , B2F

INT CL⁶ A61H 33/02 33/02 , B05B 7/04 7/08 7/12

Online database: WPI

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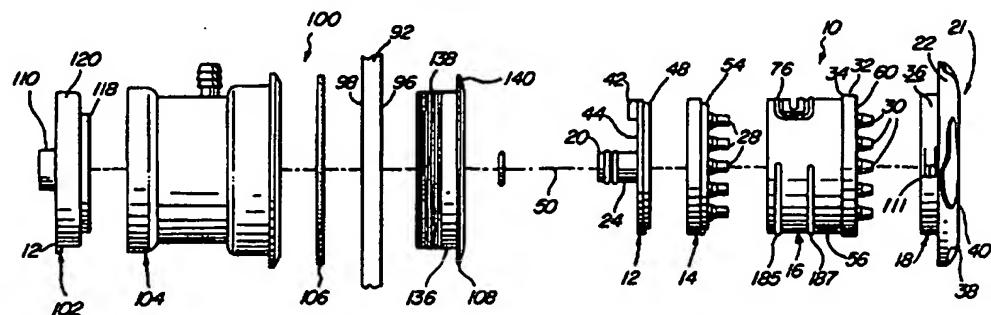
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(54) Jets and hydrotherapy apparatus

(57) A jet for use in spas and hydrotherapeutic reservoirs having a first set of nozzles (28) aligned in a plane at the water entrance side of the jet and a second set of nozzles (30) aligned one-to-one with the first set of nozzles at the water exit side of the jet. A chamber (76) separates the two sets of nozzles and includes a slot (66) which is used to introduce air into the fluid stream. The amount of air introduced into the chamber is controlled by the user by rotating the jet within its housing from a maximum air intake position to a "no-air" intake position, air being introduced through a slot surrounded by a rectangular seal structure. A housing (100) is provided to mount the jet within the wall of a spa comprising a rear wall mounting (104), an end cap (102) and a front wall mounting (108). Water is introduced to the multiple jet structure via a single horizontal water inlet (24). The servicing of multiple jets by the single water inlet and air line improves plumbing reliability and further reduces labour by minimizing the number of plumbing joints.



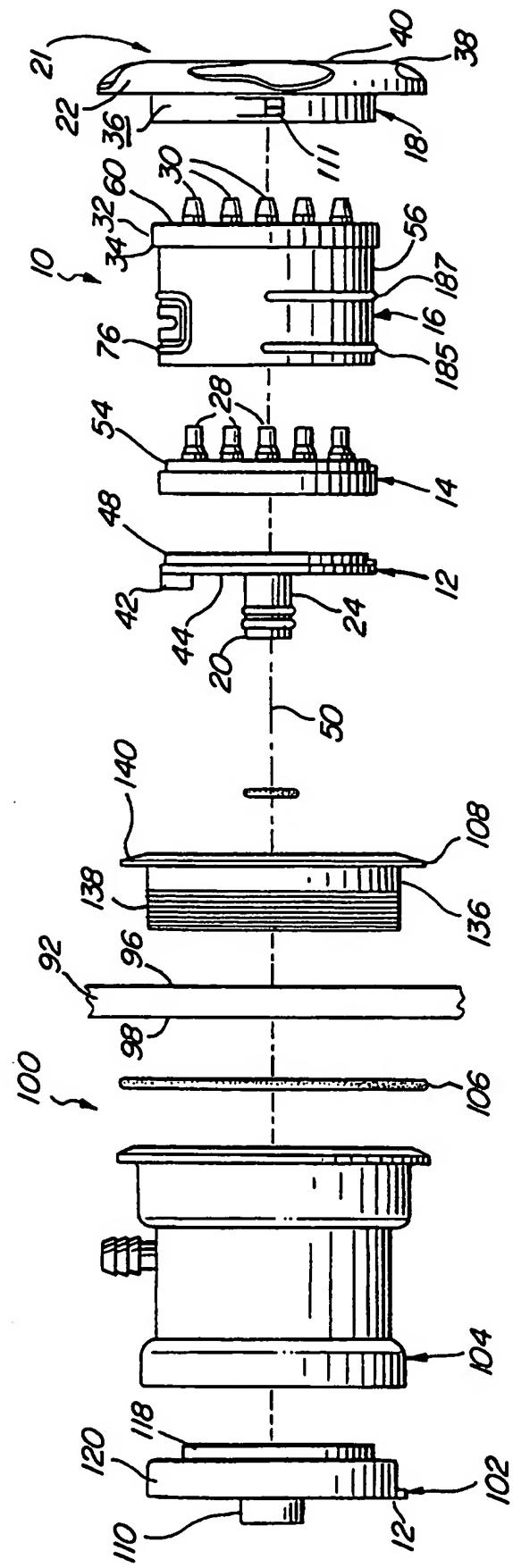


FIG 1

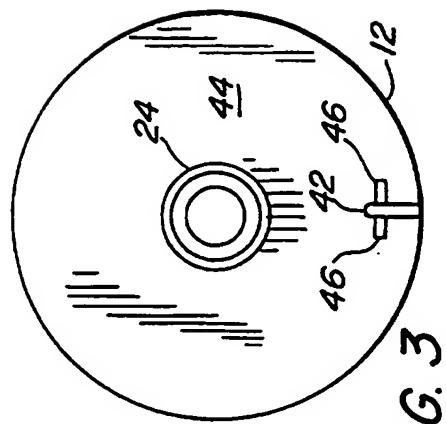


FIG. 3

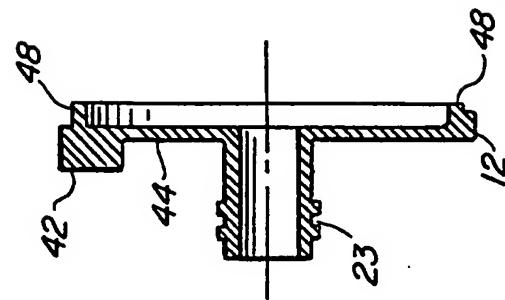


FIG. 4

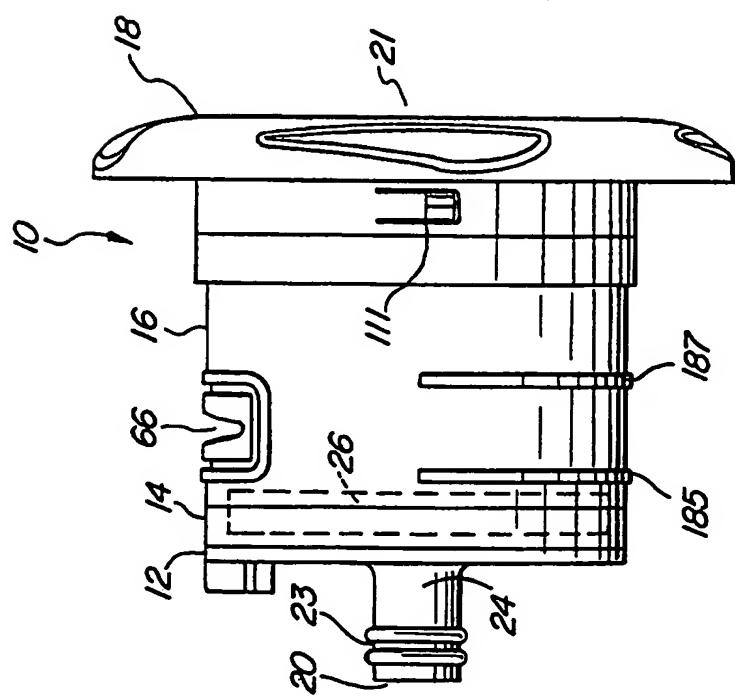


FIG. 2

FIG. 6

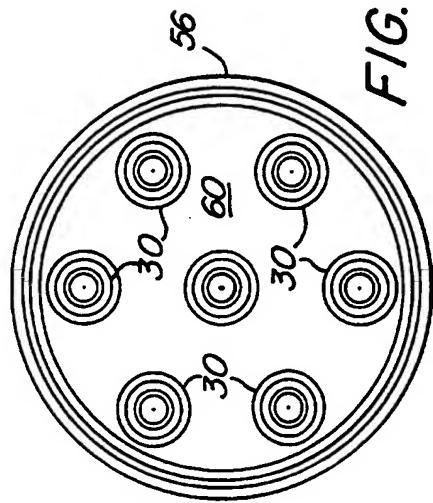


FIG. 5

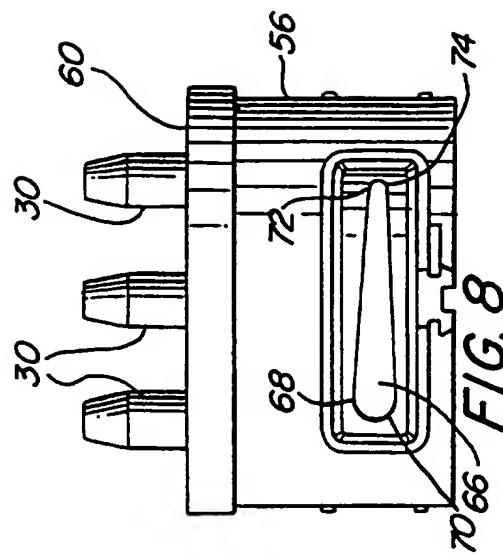
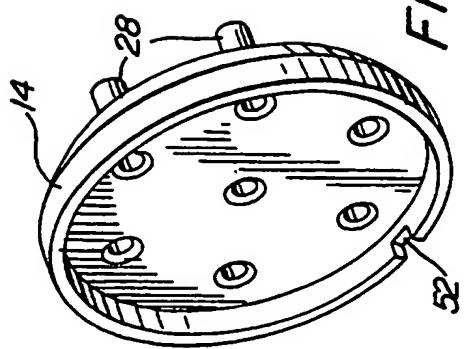


FIG. 8

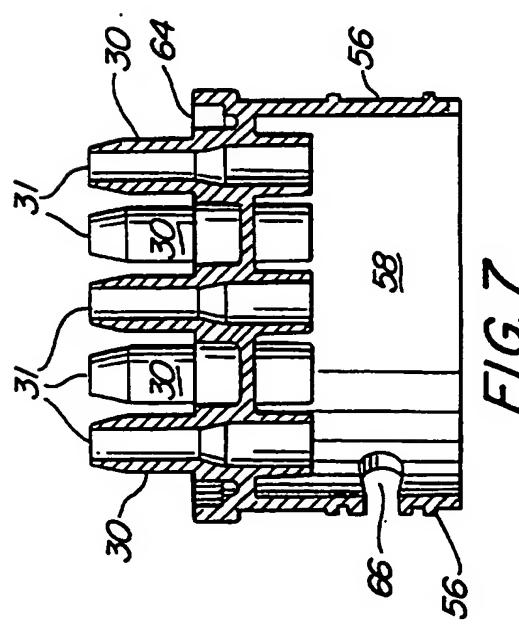


FIG. 7

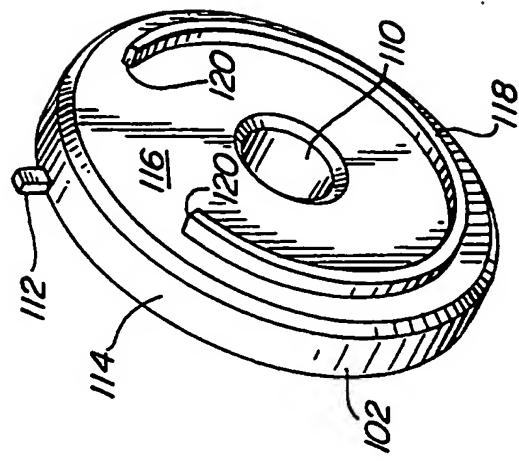


FIG. 11

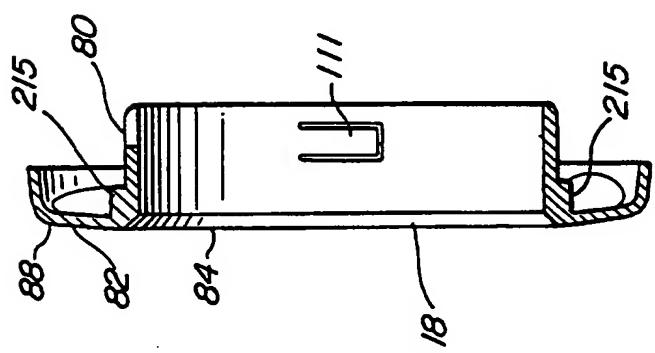


FIG. 10

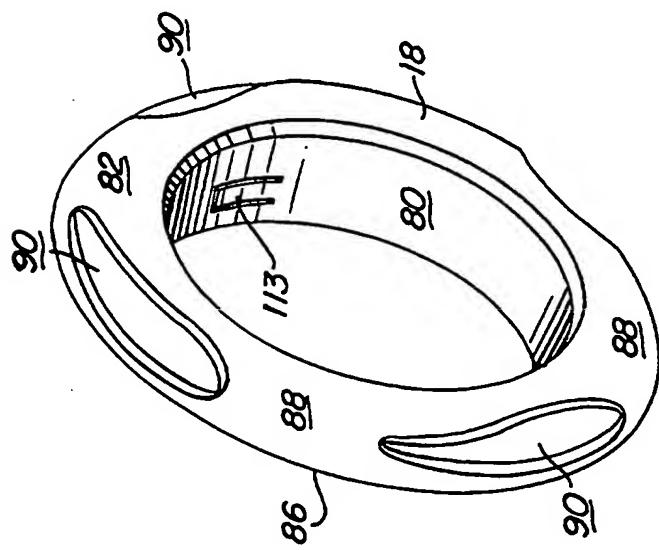


FIG. 9

FIG. 12

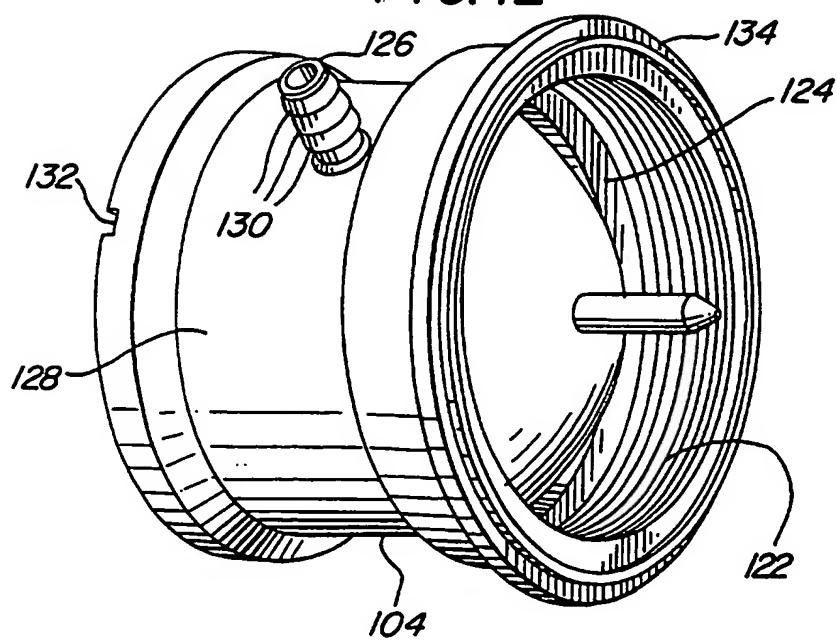
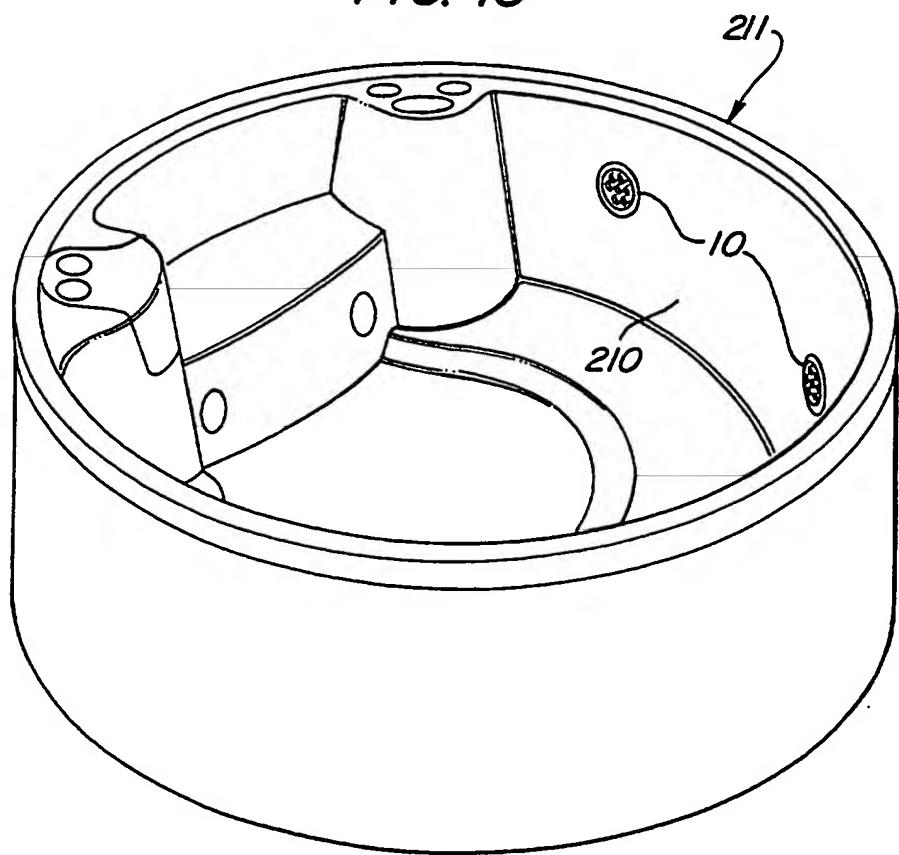


FIG. 13



JETS AND HYDROTHERAPY APPARATUS

The present invention relates generally to hydrotherapy reservoirs such as spas, whirlpools, and baths and, more specifically, to a hydrotherapy jet which can be mounted to a hydrotherapy reservoir and supplied with a pressurized source of heated water and air to produce multiple streams of water and air which can be adjusted to suit the user's tastes.

10 The soothing and rehabilitating effects of spas have been known to the medical profession and those concerned with field of athletics for many years, and in more recent years their popularity has spread to homes as well. For brevity the term "spa" from here on shall refer generally to a family of reservoirs including whirlpools and baths which are suited for relaxing and soothing sore muscles and releasing
15 tension.

16 The expansion of the spa market into the home has led to the development of spa models which appeal to the tastes of a greater variety of people. One of the primary factors in the overall enjoyment and preference in a spa is the type, number, and location of the jets which expel the heated water and create the
20 hydrotherapy effect for which the spa is known. There have been a significant number of nozzles proposed which are designed to produce the most versatile stream with the simplest design, such as nozzles which allow the user to adjust the flow rate of the stream, nozzles which can be adjusted to allow air to be mixed with the stream of hot water, and nozzles which rotate to produce a pulsating effect. The prior art still lacks a
25 nozzle which is simple in design and yet capable of producing the effects of the present invention.

The nozzle assembly of Thrasher, U.S. Patent No. 5,014,372, includes a perpendicular water inlet and a perpendicular air inlet which are allowed to mix in a chamber, and the combination of air and water is expelled through a nozzle exit which is designed to impart a rotation on the nozzle head. The nozzle head rotates in the 5 assembly within a cage, and includes a brake washer and compression spring which can be used to manually adjust the rotational velocity of the nozzle. The nozzle can also be manually turned in a limited range to vary the alignment of the water and air inlets, and thereby vary the amount of water and air which is entering the nozzle, although the composition of air and water cannot be set by the user.

10 The nozzle assembly of Mathis, U.S. Patent No. 5,291,621, includes a nozzle head with a freely rotating rotor disposed therein which has outlets designed to impart a rotation on the rotor. The nozzle assembly has a control cylinder which controls the amount of air and water entering the nozzle assembly and which is manipulated by pressing the nozzle head against the axial thrust created by the nozzle 15 outlet to engage the nozzle head with the control cylinder, and rotating the cylinder to the preferred position. By adjusting the flow rate the nozzle automatically adjusts the speed of the rotor, but the nozzle cannot be used to adjust the composition of air and water released from the exit.

Leaverton et al., U.S. Patent No. 5,495,627 discloses a jet valve which 20 can be rotated from a full flow position to a zero flow position to allow the user to determine the exact flow rate desired, and also provides for an open-shut aeration valve. While the jet valve allows for the option of aeration of the flow or no aeration, the composition of the air cannot be adjusted. The nozzle assembly is mounted in a ball-and-socket type joint which can be manipulated to direct the stream of water and 25 air in a limited range of directions.

It should be noted that the art lacks a jet which can be adjusted to control the composition of air in the stream independent of the water flow control. Leaverton does not permit individual adjustment of the air independent of the water flow, but rather provides an open or shut valve. The Mathis nozzle has the control of 30 air tied to the control of the water, and so no independent control of the air is possible. The art thus lacks a jet wherein the control of air introduced into the jet stream is controllable within a spectrum from a maximum air intake position to a "no-air" intake position. The art further lacks an effective air intake sealing structure and the capability to plumb multiple jets from a single water inlet.

It is an object of the invention to provide an improved spa jet;

It is another object of the present invention to provide a jet structure which provides multiple streams of water and air;

5 It is another object of the present invention to provide a spa jet with adjustable air control;

It is yet a further object of the present invention to provide a nozzle with a rotatable face plate which can be used to adjust the amount of air intake of the nozzle;

10 It is still a further object of the present invention to provide a nozzle whereby a plurality of jets can be plumbed as a single jet; and

It is a still further object to provide a jet structure providing multiple jet streams and yet is plumbed as a single jet.

In accordance with one aspect of the present invention, a jet is provided with a first set of nozzles located at the water entrance side of the jet and a second set of nozzles. The second set of nozzles is aligned with the first set of nozzles in a one-to-one relationship and spaced apart from the first set of nozzles by a chamber. The chamber includes a slot or orifice whereby air can be introduced or "entrained" into the stream of water between the first and second set of nozzles, and which facilitates user control of the amount of air introduced. The multiple jet array gives rise to the appellation "Gatling jet."

In a preferred embodiment, a unitary jet comprising a body, an orifice cap, a body cap, and a face plate is provided. The jet mounts in a housing comprising a rear wall mounting, a rear wall mounting cap, and a front wall mounting. The jet is rotatable within the housing, and rotation of the jet adjusts the amount of air introduced into the fluid stream. The jet and housing cooperate to limit rotation of the jet between a maximum air intake position and a "no-air" intake position.

Other aspects of the invention include a novel sealing structure about the air intake and introduction of water to a multiple jet structure via a single horizontal rear water inlet. The servicing of multiple jets via one air line and one water line improves plumbing reliability and reduces labor by minimizing the number of plumbing joints. Various numbers of jets and various arrays and positioning of the multiple jets may be provided. An enhanced feel like fingers dispersed over an area of the user's body may be achieved.

The objects and features of the present invention, which are believed to be novel, are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and 5 advantages, may best be understood by reference to the following description, taken in connection with the accompanying drawings, of which:

Figure 1 is an exploded view of the housing structure and the jet of a preferred embodiment;

10 Figure 2 is a side view of the assembled jet of the preferred embodiment;

Figure 3 is a front view of the jet body cap;

Figure 4 is a cross-sectional view of the jet body cap;

Figure 5 is a perspective view of the jet orifice cap;

15 Figure 6 is a front view of the jet body showing the nozzle pattern;

Figure 7 is a cross-sectional view of the jet body of a preferred embodiment illustrating the chamber;

Figure 8 is a side view of the jet body illustrating the air adjustment slot;

20 Figure 9 is a perspective view of a face plate of the preferred embodiment;

Figure 10 is a cross sectional view of the face plate shown in Figure 9;

Figure 11 is a perspective view of the rear wall mounting cap of a preferred embodiment;

25 Figure 12 is a perspective view of a rear wall mounting of a preferred embodiment which includes a molded-in pressure test plug which is removed after test and is not present during normal operation; and

Figure 13 illustrates a water discharge jet according to the preferred embodiment in place in the wall of a fluid reservoir or spa.

30

The following description is provided to enable any person skilled in the art to make and use the invention and sets forth the best modes contemplated by the inventor of carrying out his invention. Various modifications, however, will

remain readily apparent to those skilled in the art, since the generic principles of the present invention have been defined herein specifically to a Gatling-type jet for use in spas and the like.

Turning now to Figure 1, the elements of a preferred embodiment of a hydrotherapeutic jet 10 and mounting structure 100 are shown. The mounting structure 100 houses the jet 10 and secures the jet to a wall 92, such as a wall of a hydrotherapeutic reservoir. The mounting structure, denoted generally as 100 comprises a rear wall mounting cap 102, a rear wall mounting 104, and a front wall mounting 108. In a preferred embodiment, an O-ring 106 is included between the rear wall mounting 104 and the wall 92.

The jet 10 comprises a jet body cap 12, a jet orifice cap 14, a jet body 16, and a face plate 18. As shown in Figure 2, a reservoir 26 is formed in between the jet body cap 12 and the jet orifice cap 14 when the two components are connected. In the preferred embodiment, the jet body cap 12, the jet orifice cap 14, the jet body 16, and the face plate 18 are permanently connected and sealed using sonic welding, an adhesive or cement to form a unitary jet structure 10 as shown in Figure 2. Each individual component of the jet structure 10 will now be described in detail.

With reference to Figures 1 and 2, the jet body cap 12 forms a first end 20 of the jet 10 and includes a tubular inlet 24 on which is formed an O-ring seat 23. The tubular inlet 24 is typically connected to a supply of pressurized heated water. The jet orifice cap 14 mates with the jet body cap 12, and the heated water entering the tubular inlet 24 fills the reservoir 26 between the two components. The jet orifice cap 14 is fixed to the jet body 16, and the jet body 16 is in fluid communication with the reservoir 26 through a plurality of rear nozzles 28 (Figure 1). Once the reservoir 26 is filled with water, the fluid pressure increases forcing the fluid through the rear nozzles 28 into the jet body 16.

At the opposite end 21 of the jet body 16 is a second plurality of nozzles 30, arranged in a plane and aligned with the first plurality of nozzles 28 in a one-to-one relationship. That is, each nozzle 28 has a corresponding nozzle 30 which is aligned, preferably along a common axis, such that fluid expelled through a nozzle 28 will form a stream which is directed into a corresponding nozzle 30. The jet body 16 includes an outer ridge 32 having a slightly larger circumference than the jet body 16, which forms a step 34 on the jet body exterior which positions the jet body 16 inside the rear mounting 104. The face plate 18 comprises a cylindrical portion 36 terminating in a beveled rim 38. When mounted to the jet body 16, the face plate 18

extends beyond the nozzles 30 at an exit plane 40 in order to protect a user from contact with the nozzles 30.

Figures 3 and 4 show the jet body cap 12 in more detail. A toe 42 projects perpendicularly from a generally vertical outer surface 44 of the jet body cap 12. As will be described below, the toe 42 is used to limit the rotation of the jet body 16 between a maximum air intake position and a "no-air" intake position. The tubular inlet 24 is concentric with the jet body cap 12 and provides the entrance for the fluid to the jet. It can further be seen that the toe 42 includes webs 46 which extend perpendicular to the toe 42 and provide additional support for the toe 42. A lip 48 is provided which is inserted into the jet orifice cap 14 to secure the jet body cap 12 therein.

Figure 5 illustrates the jet orifice cap 14 and its plurality of nozzles 28. The nozzles 28 are arranged in a generally circular pattern as shown, with the nozzles 28 aimed in a direction parallel to the axis 50 of the jet. The nozzles 28 are preferably molded in a unitary construction with the jet orifice cap 14, which may include a notch 52 along a circumferential edge which cooperates with a tab on the jet body cap (not shown) to align the two components.

In Figures 6-8, the jet body 16 is illustrated in greater detail. A jet pattern of the preferred embodiment is shown comprising seven nozzles 30, six along a common circumference and one in the center. A cross-sectional view (Figure 7) shows the cylindrical wall 56 defining a chamber 58 in the interior of the jet body 16. The nozzles 30 are of the same length and are shown protruding from an end 64 of the jet body 16 with the ends 31 of the nozzles 30 terminating in a common plane. A teardrop-shaped slot or air orifice 66 is located on the side of the jet body 16 in the cylindrical wall 56, and permits access to the chamber 58 of the jet body 16. The slot 66 narrows or tapers in the circumferential direction from a maximum width 68 at a first end 70 to a minimum width 72 at a second end 74. As will be described, when a supply of air is placed adjacent the slot 66, the rotation of the jet causes more air to enter the chamber 58 when the maximum width 68 of the slot 66 is adjacent the air supply, and when the jet is rotated away from this "maximum air intake" position the amount of air introduced into the chamber 58 decreases. Around the slot 66 is a groove which holds a sealing O-ring 78 to seal the jet body 16 when it is placed in the wall mounting 100.

In Figures 9 and 10 a face plate 18 is shown comprising a cylindrical portion 80 terminating in a beveled rim 82. The face plate 18 has an exit plane 84 and the rim 82 includes an outer surface 88, with beveled areas 90 for use in gripping the face plate 18. The cylindrical portion 80 is sized such that when the face plate 18 is 5 rigidly mounted to the jet body 16 in its intended configuration (see Figure 2), the exit plane 84 of the face plate 18 extends beyond the nozzle tips 31 to protect a user from contact with the nozzles 30. The beveled surfaces 90 improve the grip of the face plate 18, which is used to rotate the jet body within the mounting structure. A granular surface can be added to the face plate to further improve the gripping surface of the 10 face plate 18, which is usually wet and slippery when in use.

In Figure 11, the rear wall mounting cap 102 is illustrated. The rear wall mounting cap 102 fits into the rear wall housing and operates to secure the jet inside the housing. A tubular extension 110 is provided, which is sized to receive the tubular inlet 24 of the jet body cap 12 to protect the tubular inlet 24. The rear wall 15 mounting cap 102 fits snugly into the rear wall housing 104 to close the housing. At the perimeter 114 of the rear wall mounting cap 102 is a tab 112 which projects radially from the perimeter 114. The tab 112 is used to align the rear wall mounting cap 102 within the rear wall mounting 104 using a notch 132 in the end of the rear wall mounting 104.

20 On the inner surface 116 of the rear wall mounting cap 102 is an arcuate ridge 118 which opposes the jet body cap 12 when the rear wall mounting cap 102 is in place in the rear wall housing 104 (see Figure 1). The arcuate member 118 acts as a stop to limit the rotation of the jet 10 inside the mounting structure when the toe 42 of the jet body cap 12 is positioned between the ends 120 of the arcuate 25 member 118. In this configuration, the jet is free to rotate between the ends 120 of the arcuate member 118 on the rear wall mounting cap 102, but cannot rotate outside of this range. When the tab 112 on the rear wall mounting cap 102 is inserted into the notch 132, the ends 120 of the arcuate member 118 are positioned to coincide with the maximum air intake position and the "no-air" intake position of the jet body 16.

30 In Figure 12, the rear wall mounting 104 is shown as a cylindrical, open housing including internal threads 122 and a circumferential lip 134 at one end. At the rear of the mounting is the notch 132 which cooperates with the tab 112 on the rear wall mounting cap 102 to specify the relative positions of the mounting 104 and the cap 102. A hollow stem 126 protrudes from a central outer wall 128 of the rear 35 wall housing 104 and provides a channel by which air can be introduced into the

interior of the rear wall housing 104. The hollow stem 126 is sized to be inserted into an air hose (not shown) and is provided with conical ridges 130 which facilitate such insertion and resist detachment of the air hose.

The stem 126 is positioned adjacent the slot 66 of the jet body when 5 the jet 10 is housed inside the rear wall mounting 104 such that air passing through the stem is introduced directly into the chamber 58 of the jet body 16 via the slot 66. As noted, the amount of air introduced is dependent upon the width of the slot directly adjacent the stem 126 such that the user can control the amount of air injected into a stream of water by rotating the position of the jet 10 in between the maximum air 10 intake position and the "no-air" intake position defined concurrently by the ends 64,70 of the slot 66 and the ends 120 of the arcuate member 118 on the rear wall mounting cap 102. The "no-air" intake position is defined by rotating the slot 66 just beyond the stem 126 such that no air is introduced into the chamber 58. Because the slot 66 gradually increases in width as the jet 10 is rotated towards the maximum air intake 15 position, allowing a greater amount of air into the chamber 58, a user can control the amount of air which is introduced into the stream of water; in effect enabling the user to control the intensity of the hydrotherapy.

In Figure 1, the front wall mounting 108 is shown having a cylindrical portion 136 with external threads 138 which mate with the internal threads of the rear 20 wall mounting 104 to fasten the two components together. When placed in an opening of the wall of a spa sized to receive the cylindrical member 136, the rotation of the front wall mounting 108 into the rear wall mounting 104 on respective sides of the wall 92 secures the jet 10 in place. The circumferential lip 140 on the front wall mounting 108 bears against the wall 92 on the front side 96 while the circumferential 25 lip 134 on the rear wall mounting 104 bears against the wall 92 on the rear side 98. In this manner it can be seen that the jet 10, while mounted in the housing structure 100, can be secured to a wall of a spa or other hydrotherapeutic reservoir for operation thereat. An O-ring 106 is preferably located between the rear wall mounting 104 and the wall 92 to reduce the possibility of leakage.

30 The extent to which the adjustable body assembly 10 extends into the mounting structure 100 is determined by the length of the assembly 10 and the abutment between a front face of the front wall mounting 108 and a plurality of stops 215 (Figure 10) formed on the face plate 18. Surfaces facilitating rotation of the adjustable body assembly 10 within the wall fitting assembly 11 are provided by 35 semicircular raised bearing surfaces 185, 187 on the jet body 16 and by the interface

between the circular inner rim 101 of the front wall mounting 108 and the cylindrical portion 80 of the face plate 18.

The cylindrical portion 80 of face plate 18 further may include first and second circumferential tabs 111, 113 projecting therefrom and diametrically disposed from one another. These tabs 111, 113 have a spring bias to them which allows them to be depressed and thereafter snap behind an inner ridge of the front face of the front wall mounting 108, thereby retaining the face plate 18 in position, rotatably mounted within the front wall mounting 108. Each tab 111, 113 may further include a chamfered leading edge to assist in depressing the respective tab 111, 112 as it contacts the front face of the front wall mounting 108 during insertion into the interior of the front wall mounting 108. Such chamfered leading edges make the face plate 18 easier to insert than it is to remove.

The operation of the Gatling-type jet 10 will now be described. When the jet 10 is placed in the housing structure 100, the stem of the rear wall mounting 126 is aligned with the slot 66 of the jet body 16. The toe 42 of the jet body cap 12 is at the same time disposed between the ends 120 of the arcuate member 118 of the rear wall mounting cap 102 to limit the rotation of the jet between the maximum air intake position and the "no-air" intake position. The tubular inlet 24 of the jet 10 is connected to a source of pressurized, heated water which enters the jet and immediately fills the reservoir 26 between the jet body cap 12 and the jet orifice cap 14. The reservoir 26 quickly fills and the building fluid pressure generated therein is released by the expulsion of the water through the nozzles 28 on the jet orifice cap 14. Each nozzle 28 directs a stream of the heated water across the chamber 58 within the jet body 16, and into a corresponding second nozzle 30 positioned directly opposite the first nozzle 28. Each stream then passes through its second nozzle 30 and out of the jet 10, and as it passes through the second nozzle 30 a venturi effect is created by the second nozzle 30. The relationship of the size of the nozzles 28 to the size of the nozzles 30, both in orifice diameter and axial spacing, is responsible for generation of the venturi effect.

The user may also rotate the jet 10 using the beveled surface 90 of the face plate 18, which is exposed to the exterior of the spa wall. Rotation of the face plate 18 is limited to the range between the maximum air intake position corresponding to the alignment of the air supply channeled through the stem 126 of the rear wall mounting 104 and the slot 66 of the jet body 16 at its maximum width 70, and the "no-air" intake position corresponding to an alignment with the stem just

beyond the slot. By selecting any position along this range, the user can control the amount of air introduced into the chamber 58 and therefore the intensity of the hydrotherapy effect.

It will be understood that the embodiment described herein are merely exemplary and that a person skilled in the art may make many variations and modifications without departing from the spirit and scope of the invention. Such modifications include, but are not limited to variation in the number and positioning of the nozzles 28, 30. Various numbers of Gatling jets may be placed in various locations of various fluid reservoirs such as spas, tubs, whirlpools, and the like. In Figure 13, two Gatling jets 10 are shown mounted in the inner wall 210 of a fluid reservoir or spa shell 211. All such variations and modifications are intended to be included within the scope of the invention as defined in the appended claims.

CLAIMS

1 1. A jet for use in use in a hydrotherapeutic reservoir comprising:
2 a cylindrical, hollow jet body defining a chamber therein and having, at a
3 first end of said jet body, a plurality of rear nozzles directed
4 parallel to an axis of said jet body; and, at a second end, a
5 plurality of front nozzles, each front nozzle being aligned with
6 one of said rear nozzles, said front nozzles and said rear nozzles
7 being spaced apart by said chamber
8 means for introducing a flow of air into said chamber;
9 means actuatable by a user for adjusting the flow of air introduced into
10 said chamber from a "no-air" intake position to a maximum air
11 intake position; and
12 fluid intake means at said first end of said jet body for receiving a flow
13 of pressurized fluid.

1 2. A jet as recited in Claim 1 wherein said fluid intake means
2 comprises a single tubular inlet extending horizontally from said jet body and in fluid
3 communication with a reservoir within said jet body, said reservoir being in fluid
4 communication with said chamber via said plurality of rear nozzles.

1 3. A jet as recited in Claim 2 wherein said means for adjusting the
2 flow of air introduced into said chamber comprises a slot in a wall of said jet body
3 adjacent said means for introducing air into said chamber, said slot tapering in width
4 from a maximum width at a first end to a minimum width at a second end, said slot
5 positioned along a path on said jet body adjacent said means for introducing air when
6 said jet body is rotated with respect thereto.

1 4. A jet as recited in Claim 3 further comprising wall mounting
2 means for mounting said jet body into a wall of said hydrotherapeutic reservoir, said
3 wall mounting means comprising a rear wall mounting means for housing said jet body
4 while permitting rotation of said jet body therein, and a front wall mounting means
5 cooperating with said rear wall mounting means to secure said jet in said wall of said
6 hydrotherapeutic reservoir.

1 5. A jet as recited in Claim 4 further comprising means for limiting
2 rotation of said jet body to a range between the maximum air intake position and a "no-
3 air" intake position, where the maximum air intake position corresponds to an alignment
4 of said first end of said slot with said means for introducing a quantity of air into said
5 chamber, and the "no-air" intake position corresponds to a rotation of said jet body
6 beyond the second end of said slot such that said means for introducing air into said
7 chamber is not aligned with said slot.

1 6. A jet as recited in Claim 5 wherein said rear wall mounting
2 includes a circumferential lip at a first end which is adapted to abut said wall of said
3 hydrotherapeutic reservoir at an inner surface, and wherein said front wall mounting
4 includes a circumferential lip adapted to abut said wall of said hydrotherapeutic
5 reservoir at an outer surface, and where said cooperation of said front and rear wall
6 mountings include mating internal and external thread means for removably securing
7 said jet to said wall of said reservoir.

1 7. A jet as recited in Claim 6 wherein said rear wall mounting
2 includes a cap at a second end comprising a concentric tubular member at a center
3 thereof and means for fixing said jet body in said range between said maximum intake
4 position and said "no-air" intake position, said means comprising a tab extending
5 radially from said cap which cooperates with a notch on said rear wall mounting fixing
6 said jet body within said range.

1 8. A jet as recited in Claim 7 wherein said means for limiting said
2 rotation of said jet body to said range further comprises an arcuate member protruding
3 from an inner surface of said cap, said arcuate member concentric with said tubular
4 member and having first and second ends defining first and second stops, said stops
5 corresponding to said maximum air intake position and said "no-air" intake position, and
6 where said jet body further comprises toe means extending between said first and
7 second stops for limiting rotation of said jet body therebetween.

1 9. A jet as recited in Claim 8 wherein said rear wall mounting
2 further comprises an inner circumferential shoulder and said jet body comprises an outer
3 ridge such that said inner shoulder and said outer ridge abut when said jet body is
4 housed in said rear wall mounting, and where said abutting aligns said slot with said
5 means for introducing air into said chamber.

1 10. A jet as recited in Claim 9 wherein said means for introducing air
2 into said chamber comprises a single hollow stem extending from a side of said rear
3 wall mounting at said slot when said inner shoulder of said wall mounting abuts said
4 outer ridge of said jet body, said stem adapted to be inserted into an air hose and
5 communicate air from said air hose to said chamber when said stem is rotated into
6 alignment with said slot.

1 11. A jet as recited in Claim 10 wherein said hollow stem includes a
2 plurality of external conical ridge means for facilitating insertion of said stem into said
3 air hose and resisting withdrawal of said stem from said air hose.

1 12. A jet as recited in Claim 10 further comprising sealing means
2 about said slot for inhibiting air from escaping between said rear wall mounting and said
3 jet body.

1 13. A jet as recited in Claim 12 wherein said sealing means
2 comprises an O-ring mounted in a groove around said slot such that said O-ring contacts
3 said rear wall mounting and said jet body.

1 14. A jet as recited in Claim 13 further comprising a face plate
2 mounted to said jet body at said second end, said face plate comprising a cylindrical
3 member terminating in a beveled rim, a plane defined by said beveled rim extending
4 beyond said plurality of front nozzles.

1 15. A jet for use in a hydrotherapeutic reservoir comprising:
2 a jet body cap having a concentric tubular inlet extending axially thereto;
3 an orifice cap mounted to said jet body cap and defining a reservoir
4 therebetween, said orifice cap comprising a plurality of nozzles
5 arranged in a plane and directed parallel to each other in an axial
6 direction;
7 a jet body mounted to said orifice cap and comprising a cylindrical wall
8 defining a chamber therein, and a plurality of nozzles at an end of
9 said jet body aligned with said plurality of nozzles of said orifice
10 cap, said jet body further comprising a slot in said cylindrical
11 wall extending generally in the circumferential direction, said
12 slot gradually reducing in width from a maximum width at a first
13 end to a minimum width at a second end; and

14 a face plate mounted to said jet body comprising a cylindrical member
15 terminating in a beveled rim extending beyond said plurality of
16 nozzles of said jet body.

1 16. The jet as recited in Claim 16 further comprising a mounting
2 structure comprising:

3 a cylindrical rear wall fitting sized to receive said jet therein and having
4 first and second open ends, said cylindrical rear wall fitting
5 including a stem extending radially outward and positioned to be
6 adjacent said slot on said jet body, and further comprising
7 internal threads at a first open end;

8 a wall fitting cap mating with said cylindrical rear wall fitting, said wall
9 fitting cap including a tubular member sized to receive said
10 tubular inlet of said jet body cap, said wall fitting cap further
11 comprising means for resisting rotation of said wall fitting cap
12 within said cylindrical rear wall fitting, said wall fitting cap
13 further comprising means for limiting rotation of jet body within
14 said rear wall fitting; and

15 a front wall fitting comprising a flange having external threads, said front
16 wall fitting mating with said internal threads of said rear wall
17 fitting to secure said jet to a wall of said hydrotherapeutic
18 reservoir.

1 17. A jet for use in use in a hydrotherapeutic reservoir comprising:
2 a cylindrical, hollow jet body defining a chamber therein and having, at a
3 first end of said jet body, a plurality of rear nozzles directed
4 parallel to an axis of said jet body; and, at a second end, a
5 plurality of front nozzles, each front nozzle being aligned with
6 one of said rear nozzles, said front nozzles and said rear nozzles
7 being spaced apart by said chamber

8 a single opening for introducing a flow of air into said chamber;
9 means actuatable by a user for adjusting the flow of air introduced into
10 said chamber through a range from a "no-air" intake position to a
11 maximum air intake position; and

12 a single fluid inlet at said first end of said jet body for receiving a flow of
13 pressurized fluid, whereby one fluid inlet and one air inlet service
14 a plurality of hydrotherapy nozzles.

1 18. Hydrotherapy apparatus comprising:
2 a spa having an inner wall; and
3 a fluid discharge jet sealably mounted in said inner wall, said jet having a
4 plurality of protruding fluid discharge nozzles, a single water
5 inlet, and a single air inlet.

1 19. The apparatus of Claim 18 wherein said plurality comprises at
2 least four discharge nozzles, each recessed within an outer rim of said jet.

20. A jet for use in a hydrotherapeutic reservoir substantially as hereinbefore described with reference to, and as illustrated by, the accompanying drawings.

21. Hydrotherapy apparatus substantially as hereinbefore described with reference to, and as illustrated by, the accompanying drawings.

Amendments to the claims have been filed as follows

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CLAIMS

1. A jet for placement in a wall of a hydrotherapeutic reservoir comprising:
 - 5 a cylindrical, hollow jet body defining a chamber therein and having, at a first end of said jet body, a plurality of rear nozzles directed parallel to and spaced apart from an axis of said jet body; and, at a second end, a plurality of front nozzles, each front nozzle being aligned with a respective one of said rear nozzles, said front nozzles and said rear nozzles being spaced apart by said chamber;
 - 10 means for introducing a flow of air into said chamber;
 - 15 means actuatable by a user for adjusting the flow of air introduced into said chamber from a no-air intake position to a maximum air intake position; and
 - 20 fluid intake means at said first end of said jet body for receiving a flow of pressurized fluid.
2. A jet as recited in Claim 1, wherein said fluid intake means comprises a single tubular inlet extending horizontally from said jet body and in fluid communication with a reservoir within said jet body, said reservoir being in fluid communication with said chamber via said plurality of rear nozzles.
- 25 3. A jet as recited in Claim 2, wherein said means for adjusting the flow of air introduced into said chamber comprises a slot in a wall of said jet body adjacent said means for introducing air into said chamber, said slot tapering in width from a maximum width at a first end to a minimum width at a second end, said slot positioned along a path on said jet body adjacent said means for introducing air when said jet body is rotated with respect thereto.
- 30 4. A jet as recited in Claim 3, further comprising wall mounting means for mounting said jet body into the

wall of said hydrotherapeutic reservoir, said wall
mounting means comprising a rear wall mounting means for
housing said jet body while permitting rotation of said
jet body therein, and a front wall mounting means
5 cooperating with said rear wall mounting means to secure
said jet in said wall of said hydrotherapeutic reservoir.

5. A jet as recited in Claim 4, further comprising
means for limiting rotation of said jet body to a range
between the maximum air intake position and a no-air
10 intake position, where the maximum air intake position
corresponds to an alignment of said first end of said slot
with said means for introducing a flow of air into said
chamber, and the no-air intake position corresponds to a
rotation of said jet body beyond the second end of said
15 slot such that said means for introducing air into said
chamber is not aligned with said slot.

6. A jet as recited in Claim 5, wherein said rear
wall mounting means includes a circumferential lip at a
first end which is adapted to abut said wall of said
20 hydrotherapeutic reservoir at an inner surface, and
wherein said front wall mounting means includes a
circumferential lip adapted to abut said wall of said
hydrotherapeutic reservoir at an outer surface, and where
said cooperation of said front and rear wall mounting
25 means include mating internal and external thread means
for removably securing said wall mounting means to said
wall of said reservoir.

7. A jet as recited in Claim 6, wherein said rear
wall mounting includes a cap at a second end comprising a
30 concentric tubular member at a center thereof and means
for fixing said jet body in said range between said
maximum intake position and said no-air intake position,
said means for fixing comprising a tab extending radially
from said cap which cooperates with a notch on said rear
35 wall mounting means.

8. A jet as recited in Claim 7, wherein said means for limiting said rotation of said jet body to said range further comprises an arcuate member protruding from an inner surface of said cap, said arcuate member concentric with said tubular member and having first and second ends defining first and second stops, said stops corresponding to said maximum air intake position and said no-air intake position, and where said jet body further comprises toe means extending between said first and second stops for limiting rotation of said jet body therebetween.

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10. A jet as recited in Claim 8, wherein said rear wall mounting further comprises an inner circumferential shoulder and said jet body comprises an outer ridge such that said inner shoulder and said outer ridge abut when said jet body is housed in said rear wall mounting, and where said abutting aligns said slot with said means for introducing air into said chamber.

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10. A jet as recited in Claim 9, wherein said means for introducing air into said chamber comprises a single hollow stem extending from a side of said rear wall mounting means which is adjacent said slot when said inner shoulder of said rear wall mounting means abuts said outer ridge of said jet body, said stem adapted to be inserted into an air hose and communicate air from said air hose to said chamber when said slot is rotated into alignment with said stem.

11. A jet as recited in Claim 10, wherein said hollow stem includes a plurality of external conical ridge means for facilitating insertion of said stem into said air hose and resisting withdrawal of said stem from said air hose.

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12. A jet as recited in Claim 10, further comprising sealing means about said slot for inhibiting air from escaping between said rear wall mounting means and said jet body.

13. A jet as recited in Claim 12, wherein said sealing means comprises an O-ring mounted in a groove around said slot such that said O-ring contacts said rear wall mounting means and said jet body.
- 5 14. A jet as recited in Claim 13, further comprising a face plate mounted to said jet body at said second end, said face plate comprising a cylindrical member terminating in a beveled rim, a plane defined by said beveled rim extending beyond said plurality of front nozzles.
- 10 15. A jet for placement in a wall of a hydrotherapeutic reservoir comprising:
a jet body cap having a concentric tubular inlet extending axially therefrom;
- 15 an orifice cap mounted to said jet body cap and defining a reservoir therebetween, said orifice cap comprising a plurality of nozzles arranged in a plane and directed parallel to each other in an axial direction;
- 20 a jet body mounted to said orifice cap and comprising a cylindrical wall defining a chamber therein, and a plurality of nozzles at an end of said jet body each aligned with a respective one of said plurality of nozzles of said orifice cap, said jet body further comprising a slot in said cylindrical wall extending generally in a circumferential direction, along said cylindrical wall, said slot gradually reducing in width from a maximum width at a first end to a minimum width at a second end; and
- 25 a face plate mounted to said jet body comprising a cylindrical member terminating in a beveled rim extending beyond said plurality of nozzles of said jet body.
- 30 16. The jet as recited in Claim 15, further comprising a mounting structure comprising:
a cylindrical rear wall fitting sized to receive said jet therein and having first and second open ends,

said cylindrical rear wall fitting including a stem extending radially outward and positioned to be adjacent said slot on said jet body, and further comprising internal threads at a first open end;

5 a wall fitting cap mating with said cylindrical rear wall fitting, said wall fitting cap including a tubular member sized to receive said tubular inlet of said jet body cap, said wall fitting cap further comprising means for resisting rotation of said wall fitting cap
10 within said cylindrical rear wall fitting, said wall fitting cap further comprising means for limiting rotation of jet body within said rear wall fitting; and

15 a front wall fitting comprising a flange having external threads, said front wall fitting mating with said internal threads of said rear wall fitting to secure said jet to a wall of said hydrotherapeutic reservoir.

17. A jet for placement in a wall of a hydrotherapeutic reservoir comprising:

20 a cylindrical, hollow jet body defining a chamber therein and having, at a first end of said jet body, a plurality of rear nozzles directed parallel to and spaced apart from an axis of said jet body; and, at a second end, a plurality of front nozzles, each front nozzle being aligned with a respective one of said rear nozzles, said front nozzles and said rear nozzles being spaced apart by said chamber;

25 a single opening for introducing a flow of air into said chamber;

30 means actuatable by a user for adjusting the flow of air introduced into said chamber through a range from a no-air intake position to a maximum air intake position; and

35 a single fluid inlet at said first end of said jet body for receiving a flow of pressurized fluid, whereby one fluid inlet and one air inlet supply fluid and

air to said jet.

18. A jet for use in a hydrotherapeutic reservoir substantially as hereinbefore described with reference to, and as illustrated by, the accompanying drawings.

5 19. Hydrotherapy apparatus substantially as hereinbefore described with reference to, and as illustrated by, the accompanying drawings.



The
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Office

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Application No: GB 9715601.2
Claims searched: 1-17

Examiner: John Warren
Date of search: 22 October 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): A4N; B2F

Int Cl (Ed.6): A61H 33/00, 33/02; B05B 7/04, 7/08, 7/12

Other: ONLINE Database: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5 291 621 MATHIS - see Column 4 lines 26-30	
A	US 4 586 204 DANIELS - see Figures 7 and 8	

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
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